

## A SIMULATION CHAIN FOR THE LAGO SPACE WEATHER PROGRAM

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We simulate the expected variations of background flux at two particular sites of the Latin American Giant Observatory (LAGO) and found that these fluxes are sensible to the latitude and that neutrons and muons components, of cosmic rays, are affected due to the variation of the geomagnetic field (GF). The low energy Galactic Cosmic Ray (LEGCR) flux is modulated by physical mechanisms with very different time scales: long-term are associated with the solar cycle while short-term ones are produced by transient perturbations in the calm solar wind, causing rapid decreases in the galactic cosmic ray intensity following by a slow exponential-like recovery, known Forbush Decreases.

LAGO (Latin American Giant Observatory) is an extended Astroparticle Observatory oriented to basic research on: the Extreme Universe, Space Weather, and Atmospheric Radiation at ground level, with single or small arrays of particle detectors at ground level, spanning over different sites covering a huge range of geomagnetic rigidity cutoffs and atmospheric absorption/reaction levels (Asorey et al. 2016). LAGO Space Weather program simulates and measures the LEGCR at ground level by Solar modulation, exploiting the global distribution of the LAGO detection network.

The integrated particle flux and its modulation at the ground level are carefully simulated by considering local atmospheric profiles and dynamic GF conditions (Asorey et al. 2015) at two particular LAGO sites: Bucaramanga, Colombia and San Carlos de Bariloche, Argentina. Our simulations show that the secondary flux is sensible to the latitude and that the secondary neutrons and muons at ground level are affected flux components due to variations of GF during a space weather phenomenon (see Figure 1).

By combining the data measured at different locations of the LAGO detection network, with those obtained from the detailed space weather simulation

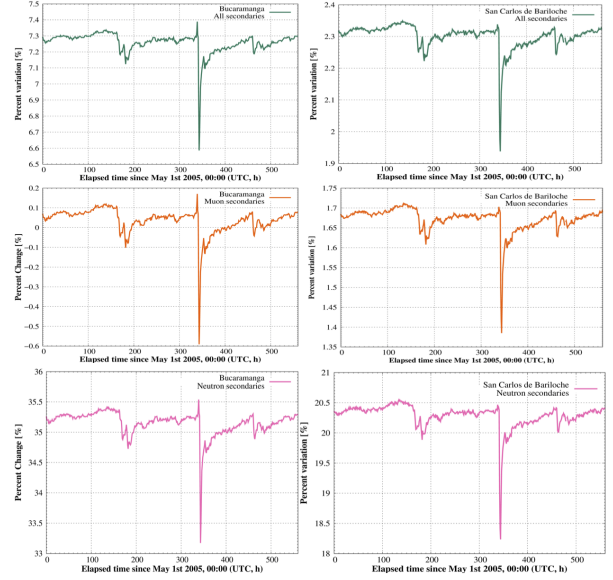


Fig. 1. Simulations of the time evolution of the expected flux of secondaries during dynamic conditions of the GF,  $\Delta\Xi_{1-2}$  for May of 2005 at Bucaramanga (left) and at San Carlos de Bariloche (right). The first row corresponds to the total flux of particles at ground level, while in the second row we illustrate the evolution of the muon flux  $\Delta\Xi_{1-2}^{\mu}$  and the third one displays the neutron flux  $\Delta\Xi_{1-2}^n$ . There is a precise time coincidence of the simulated flux variation at both sites, which is more significant in Bucaramanga than in Bariloche. It is also evident that the neutron flux at the ground level is the most affected component by the GF activity.

chain, we are now capable to provide better understanding about the temporal evolution of the small and large scales of solar and geomagnetic disturbances.

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